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Editorial

Advanced Nanomaterials for Energy and Environmental Applications

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The increasing of energy crisis and environmental pollution has drastically threatened the sustainable development of human being. Lots of technologies, for instance, rechargeable batteries and supercapacitors, solar photovoltaic cells, solar photocatalysis, biomass fuels, efficient adsorption technology, and so forth, have been developed in the past decades to exploit clean energies and efficiently deal with pollutants. The key is to obtain advanced materials with superior structures and functions as active electrodes or efficient catalysts and adsorbents. Also, it is fundamentally important to deeply understand the relationship between structure and properties.

This special issue is focused on synthesis and application of advanced nanomaterials for energy and environmental applications.

Z. Chen and colleagues work on the loading of nanosized Au in the channels of nanoporous nickel phosphate VSB-5. CO could be catalytically removed on the prepared catalyst at a lower temperature than that on ZIF-8. Enhanced catalytic activity could be observed after the first catalytic circle. The reaction mechanism has also been investigated and it was found that Au^{3+}/Au^{0} is responsible for the enhancement.

S. Peng et al. report the fabrication of Ru nanoparticles on mesoporous silica by an in situ reduced method. The prepared sample could work as a highly efficient heterogeneous catalyst for H_2 generation from the hydrolysis of an alkaline $NaBH_4$ solution. Furthermore, the prepared catalyst could be reused and the residual catalytic activity of the repeated Ru/HMS still remains 47.7% after 15 runs.

Carbon nanotubes (CNTs) have attracted attention in the last decade due to their prominent properties. G. Allaedini and colleagues investigate the effect of alumina and magnesia supported Ge nanoparticles on the growth of carbon nanotubes by using the chemical vapor deposition method. A tip-growth mechanism is proposed for the grown carbon nanotubes. The synthesized sample is confirmed as carbon nanotube by using TEM, XRD, and Raman techniques. It has also been found that the degree of graphitization of prepared CNTs has a close relationship with the support.

D. H. Kim et al. investigated the selective catalytic reduction (SCR) activity by using V_2O_5/TiO_2 as the catalyst. Ce and W can work as the promoter for the SCR process and the enhanced selectivity and activity have been observed. The SCR reactivity at low temperature region and N_2 selectivity

at high temperature region could be improved by changing the impregnating order between W and Ce precursors on V_2O_5/TiO_2 catalyst. Various techniques have been used to analyze the synthesized samples. It was found that W- and Ce-overloaded $W/Ce/V/TiO_2$ (15 : 15 : 1 wt%) catalyst shows the most remarkable De-NO_x properties over the wide temperature region and high N_2 selectivity at high temperature region (350–400°C). The mechanism of the superior activity has also been proposed.

Finally, G. Santana Rodríguez et al. reported their research on nanosized ytterbium stabilized zirconia (YbSZ) thin films prepared by ultrasonic spray pyrolysis. The high conductivity is investigated and resulted from different physical parameters in the films.

All of these papers demonstrate how the advanced nanomaterials have been constructed and have potential applications in environmental control and development of new energy for the sustainable development of society. The editors hope that the readers of this special issue will benefit from designing and constructing novel advanced nanomaterials with applications in environmental control and new energy development.

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